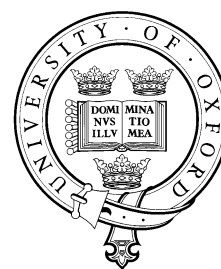


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OPHI

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**A Sensitivity Assessment of
Multidimensional Poverty to various
sets of Missing Dimensions'
Indicators: The Chilean Case**

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I. Introduction

There is world-wide agreement on poverty reduction as a key development policy goal; however there is little agreement on the definition of poverty. The definition of poverty is critical for successful poverty eradication strategies. Traditionally poverty was approached using univariate metrics, such as income or consumption expenditures under the assumption that these variables capture the most relevant aspects of human development. Inspired by the work of economist Amartya Sen (1979) the definition of development has shifted over the last few years. Development is now seen as "an expansion of human freedoms that people value and have reason to value". There is widespread agreement that poverty is multidimensional; it is not enough to look only at income poverty, we have also to look at other attributes. As Sen points out, "the role of income and wealth. . . *has to be integrated* into a broader and fuller picture of success and deprivation" (Atkinson, 2002).

Following Sen's lead, several institutions have considered this broader definition of poverty, utilizing various dimensions to measure poverty such as income, education, and health. For example, The United Nation's Human Development Index, and Human Poverty Index, amongst others. More recently, there has been a major concern about relevant dimensions that were missing in these analyses, dimensions that are of value to poor people, but where there is scant or unavailable data. In this sense, Alkire (2007) identified four missing dimensions in multidimensional poverty measurements, such as quality of employment, empowerment or agency, physical safety, and the ability to go about without shame. These missing dimensions add relevant information to the standard multidimensional measurements (Ranis et al, 2006). This new information can provide a drastic shift in how we assess poverty, as well as a deeper understanding of poverty, and therefore better poverty targeting for policy purposes.

In 2007, the Oxford Poverty and Human Development Initiative, developed specific studies for each dimension, in an attempt to conceptualize each dimension and develop internationally comparable data. The studies identify different aspects within each missing dimension, with their respective indicators. This study is intended to add to the discussion of the identification of the poor, by analyzing the sensitivity to the multidimensional poverty index - using adjusted FGT (Alkire & Foster, 2008) - to a set of indicators of each missing dimension; acknowledging that different approaches to measuring each missing dimension will lead to different outcomes.

In this sense, our main objective is to evaluate the sensitivity of multidimensional poverty to different indicators chosen for each missing dimension. Moreover, we would like to analyze this sensitivity within various sub-groups. Finally, we would like to identify which indicators are more informative, have more variance, and have more policy implications, within each missing dimension.

This is an important topic to assess for all work in multidimensional poverty, as it will underline the importance of how indicators are chosen when assessing for poverty in the multidimensional framework.

Multidimensional Poverty measurement has many steps. The most important of which are "identification", which defines the criteria for distinguishing who are the poor and who are not; and "aggregation", a process where data on poor people is synthesized into an overall indicator of poverty (Sen, 1976). Our assessment is at the individual level and we assume a normative set of dimensions, which include traditional indicators of income, health, education, housing, and the four missing dimensions as identified by Alkire (2007): quality of employment (Lugo, 2007), empowerment or agency (Ibrahim and Alkire, 2007), physical safety (Diprose, 2007), and the ability to go about without shame (Zavaleta, 2007).

Our paper is as follows: In section to we briefly summarize the literature on the four missing dimensions. Following, we identify the indicators for each missing dimension and explain the various sets of indicators and how they are compiled for each missing dimension. Next we present our results these various sets' affect on the sensitivity of the multidimensional poverty measurement.

II. Literature Review

Multi-dimensional Poverty Measurement.

Missing Dimensions.

*Agency & Empowerment.*¹ Agency and empowerment are understood at times as intangible words that harness many different definitions depending on the socio-cultural and political context in which they are used. Words such as self-reliance, autonomy, self-determination, liberation, freedom, participation, decision-making capability, mobilization, and self-confidence, are used in connection with or in an effort to define agency and empowerment.

Empowerment is viewed in various contexts. It is a term that is often utilized in development studies, albeit often times in a qualitative and/or subjective approach based on an individual's emotional state and/or judgments. This definition would explain an *un-empowered* person as someone who is *powerless* to affect change in the basic unit of their own life. Likewise, Narayan (2005) views empowerment as an individual's ability to make choices in the own lives that affect change therein. Agency is related but distinct from empowerment, Samman & Santos (2009) use Sen's definition of agency as: "what a person is free to do and achieve in pursuit of whatever goals or values he or she regards as important." Following Sen's capability approach, agency is therefore the set of capabilities that an individual has at their disposal to make choice

¹ Please view Ibrahim & Alkire (2007) for a complete review of this missing dimension and the proposed indicators associated with it.

in their own lives. Following that line of thought, empowerment can be viewed as an expansion of agency (Ibrahim & Alkire, 2007). Samman & Santos (2009) liken this definition to a "trend variable."² This is the definition and relationship that we henceforth use in this paper.

Empowerment, or expansion of agency is important dimension because it affects human development both intrinsically and instrumentally. It as an end in itself is important, helping individuals make choices in their own lives. Instrumentally, it is also a means to other development outcomes. Sen places a high value of agency in his view of human development and capabilities approach, as agency expands so does an individual's power to effect change in other aspects of their life that they value, influencing greater changes thorough out their community and the world as a whole.

It is apparent that the realized empowerment of poorer and/or socially excluded individuals and communities has the potential for huge impacts on both micro and macro level determinants of development. Determinants such as gender equality in household and business management, to political participation at the local and national levels. While the importance of increasing empowerment is undeniable, internationally comparable data on indicators of empowerment/agency do not exist.

Empowerment is a difficult dimension to measure, because of its "distinctive features."³ Initially, agency is inherently multidimensional. It can be restrained and/or expressed in various spheres, domains and levels. "These [domains] are typically the state, in which a person is a civic actor; the market, in which the person is an economic actor; and society, in which the person is a social actor."⁴ Samman & Santos (2009) continue to explain how agency and empowerment are "relational concepts"; a specific group or individual becomes empowered in relation to another group or

² "Just as growth is the increase in GDP per capita, empowerment can be seen as the increase in agency." (p. 4)

³ Explained in detail by Samman & Santos (2009).

⁴ p.6

individual. They stress however that empowerment is not a zero-sum game, where the empowerment of one individual, inherently means the dis-empowerment of another. With that in mind, they suggest that empowerment be classified by categorizing power: *power over/control*, control over personal decisions; *power to/choice*, household decision-making and domain-specific autonomy; *power from within/change*, changing aspects in one's life on an individual level; *power with/ community*, changing aspects in one's life on a communal level (Ibrahim & Alkire, 2009).⁵

Security.⁶ As the Geneva Declaration on Armed Violence and Development (2006) states: "Armed violence destroys lives and livelihoods, breeds insecurity, fear and terror, and has a profoundly negative impact on human development. Whether in situations of conflict or crime, it imposes enormous costs on states, communities, and individuals." Violence is a huge impediment to human security and therefore for development, both on the individual and national level. "Violence impedes human freedom to live safely and securely, and can sustain poverty traps in many communities," expresses Diprose (2007). As Diprose also points out, violence in today's day and age is no longer as much international conflicts as much as acts committed by individuals, groups, or even states within their own borders.

Diprose, uses the World Health Organization's definition of violence: the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation." International comparable data on violence is scarce.

...

⁵ The indicators actually indicators used in this analysis are explain in detail in the methodology section that follows.

⁶ Please view Diprose (2007) for a complete review of this missing dimension and the proposed indicators associated with it.

*Free from Shame.*⁷ Shame and humiliation as a poverty deprivation may be initially regarded as a mental exercise. However, Sen has often stressed that absolute poverty has both material and social dimensions (Zavaleta, 2007). Sen argues, that like hunger, absolute deprivation also encompasses "being ashamed to appear in public," and therefore, it should be configured into the basic capability set. The measurement of shame and humiliation, like other capabilities is complicated because of the cultural variation. That is to say, the material deprivations that would incite shame and humiliation vary greatly, making the comparison between objective deprivations impossible on an international level. Hence, Zavaleta (2007) explored as a replacement for 'relative' material situations -which differ across cultural contexts- "direct measures of people's experiences of shame humiliation, stigma, and discrimination."⁸

Both shame and humiliation are described as feelings of rejection, isolation, a loss of respect or esteem, remorse, indignity and dishonor. Shame, differs however from humiliation in that it is an "individualistic evaluation, the idea that one has failed according to one's own standards;"⁹ whereas, humiliation involves an external event and/or the comparison to another individual or group. Both affect psychological well-being in various ways, lower self esteem, higher rates of delinquency, and poorer interpersonal relationships.

It is important to note that the "shame" indicator represents an emotional state in a particular point of time (Zavaleta, 2009).

III. Methodology

For the purposes of our analysis we have utilized in total seven different dimensions, four standard dimensions consisting of income, health, education, and housing; and the three missing dimensions. First we introduce the missing dimensions and their respective

⁷ Please view Zavaleta (2007) for a complete review of this missing dimension and the proposed indicators associated with it.

⁸ Pg. 407.

⁹ pg. 409.

indicator sets in the following section. In the case of empowerment we have identified four different sets; in the case of shame there are five sets; and lastly, for security there are three sets.

For the standard dimensions, their indicators *do not* change. For the income dimension, the indicator is the respondent's annual income. The poverty line is established at 64,134 pesos/annually, as defined by CASEN 2009. The health dimension is represented by how the respondent views their health on a scale of 0 - 4, zero being the worst and four being the best. Deprivation in the health dimension is determined for those respondents that answered 0, 1, or 2. In the case of the education dimension, we utilized years of schooling for the household head. The respondent is considered deprived if they have not completed at least 8 years of primary education. Education is a critical factor in the household head's determination of employment and income, as well as in determining the education of his/her offspring. Lastly, the housing dimension, whose indicator consists of a list of necessary attributes: adequate construction, adequate flooring, electricity, running water, and no more than 2.4 household members per bedroom. Deprivation is assigned to any household that does not count with all five necessary attributes. To analyze the sensitivity of multidimensional poverty measurement to the missing dimensions' indicator sets,

To calculate multidimensional poverty we used the Alkire and Foster (2008) adjusted FGT measurements. This family of measures satisfies a set of properties considered desirable in poverty measurement. The identification first defines a cutoff point for each considered dimension, and second, defines an *across-dimensions* cutoff, as the number of dimensions in which the household should be deprived so as to be considered poor. The second cut-off is the novelty of the approach; existing approaches to multidimensional poverty measurement are usually confined to using one of the two extreme approaches to the identification of the poor: "union" or "intersection". Union requires the individual in question to be deprived in at least one dimension; while the second requires to be deprived in all considered dimensions. While the Alkire and Foster's

approach allows for these two typical extreme criteria, it also allows for more moderate identification.

IV. Missing Dimension Indicators

i. Empowerment

Empowerment indicators can be divided into two main groups. The ones that refer to general empowerment attributes, and those that refer to domain-specific attributes. For the first group of indicators, we identified the following four:

Free Choice Ladder. [General empowerment] This indicator asks the individual to place him or herself in a rung of a ten-step ladder. The first step pertains to individuals with out liberty to elect or decide over aspects that affect their daily live. While on the highest step, individuals have full liberty over the decisions affecting their daily lives. This indicator assesses for an overall level of empowerment.

Control over personal decisions. [Power over] This indicator seeks to measure the extent to which the individual has control over personal decisions. They choose between: a) control over all their decisions; b) control over the most part of their decisions; c) control over some of their decisions; and d) no control over their decisions.

Changes in one's own life. [Power from Within] This indicator seeks to identify the *power from within* to generate change in one's own life. When asked who has the power to affect change in *their* life, they have the following options: a) their self, b) their family, c) their community, d) their local government, e) their central government, f) other. We construct this indicator as a dichotomous variable, that takes the value of 1, when the individual claims to be able "by himself" to make changes in their own life, and the value of 0 otherwise.

Changes in one's community. [Power with] This indicator is designed to assess an individual's perceived ability to change things in their community if they want to. They had the following possible responses: a) yes, very easily; b) yes, easily; c) yes, but with difficulty; d) yes, with lots of difficulty; and e) no, not at all. These responses were later grouped to be: a) yes, easily; b) yes, with difficulty and c) no.

Table 1
Indicators of Empowerment

Indicators	Responses	% Respondents
Free Choice Ladder	Steps 1 - 3	7.5%
	Step 4	5.1%
	Step 5	15.5%
	Step 6	10.3%
	Step 7	11.0%
	Step 8	11.8%
	Step 9	7.6%
	Step 10	31.4%
Control over Personal Decisions	Total Control	56.5%
	Control over majority	27.2%
	Control over some	13.2%
	No control	3.2%
Changes in community	Yes, Easily	22.2%
	Yes, with Difficulty	53.3%
	Not possible	24.6%
Changes in own life	Someone else	44.4%
	Only me	55.6%

Source: OPHI-CASEN dataset

The above four indicators, cover general aspects of one's empowerment, while the latter, reflects his or her perceived ability to generate changes in the community. Above in Table 1 you will note the percentage of respondent's answers for each of the four questions. The last type of indicators are domain-specific ones, and refer to particular decision-making areas in one's life.

Domain-specific autonomy. [Power to] This indicator measures the individual's autonomy in several specific domains: minor household expenditures, health, employment, security, and religion. For each

of the five domains this indicator seeks to differentiate the motivations behind the individual's actions, specifically whether they are autonomous¹⁰. We want to identify whether their actions are motivated by fear of punishment or hope for reward; by a desire to avoid shame or gain praise; and lastly, by the consistency of their actions with their own values and interests (Ibrahim and Alkire 2007, p. 24). Their answers are then compiled into the Relative Autonomy Index (RAI), which has been adopted from psychology's *Self Determination Theory* as elaborated by Ryan & Deci (2000). The index is constructed as follows:

RAI = (-1)[external pressure answer 1] + (-1)[external pressure answer 2] + (-1)[external expectations answer] + (3)[consistency with own values answer]

This generates a range of possible answers from (-9) being the least empowered to (9) being the most empowered¹¹. The following table (2) shows the percentage of responses within the listed ranges for all five domain-specific indicators.

¹⁰ Ryan and Deci define "a person [as] autonomous when his or her behavior is experienced as willingly enacted and when he or she fully endorses the actions in which he or she is engaged and/or the values expressed by them. People are therefore most autonomous when they act in accord with their authentic interests or integrated values and desires" (as quoted by Ibrahim & Alkire 2007, pg. 25).

¹¹ For a more thorough explanation on the domain-specific indicators and the Relative Autonomy Index please refer to Ibrahim & Alkire, 2007.

Table 2
Domain Specific Empowerment Indicators

Relative Autonomy Index (RAI)	Responses	% Respondents
Small Household Expenditures	[-9,-1]	2.9%
	[0, 5]	54.7%
	[6, 9]	42.3%
Work Decisions	[-9,-1]	4.9%
	[0, 5]	58.0%
	[6, 9]	37.1%
Health treatment	[-9,-1]	3.6%
	[0, 5]	57.0%
	[6, 9]	39.4%
Home Security	[-9,-1]	3.3%
	[0, 5]	59.9%
	[6, 9]	36.9%
Religious practice	[-9,-1]	3.2%
	[0, 5]	56.2%
	[6, 9]	40.7%

Source: OPHI-CASEN dataset

In order to identify a set of potential variables that will represent the Empowerment Missing Dimension, we identify a set of four variables that intend to capture the notion of agency. We will compare these indicators and assess for the sensitivity of poverty identification with each.

For this purposes, all the empowerment indicators (general and domain specific) were analyzed using principal components analysis (PCA) to evaluate whether these indicators were capturing the same latent phenomenon or distinct aspects of empowerment. The following variables were considered for this analysis: free choice ladder, global decision power, control individual, and control community, as well as all five RAI indicators. The exploratory PCA showed that the nine indicators correspond to three latent factors: 1) one factor grouping the five **RAI indicators**; 2) the second factor grouping free choice ladder, control over personal decisions and changes in one's own life, referred to as **general empowerment**; and lastly, 3) the indicator **changes in own community**. These three retained factors accumulate around 60 percent of the total variance. Different rotation methods were performed, determining that there were no significant differences in the factors identified or in the factor loadings, as shown in Table 3 on the next page.

These results provided us with a general framework to identify our possible set of indicators for Empowerment. We will first look at general empowerment indicators, following we will assess for domain specific indicators (RAI); and finally we will develop a composite index involving all the latent factors¹².

Starting with the group of indicators for **general empowerment** we see in Table 4 that they are correlated, but not strongly. The indicators: free choice ladder and control over personal decisions provide more information and variance, given that the variable *changes in one's own life* is a dichotomous variable (0/1) and has less explanatory power. For the purposes of assessing the Empowerment Missing Dimension, we decided to work with the two strongest indicators independently.

Next we assessed for the domain specific indicators. As shown in Table 3, we presumed that the five indicators conform to a latent variable that represents the Empowerment Missing Dimension. We performed exploratory PCA over the five RAI indicators to see if there is any relevant aspect of these variables. We identified only one factor and the scores for each one (after performing varimax and oblimin rotation), were rather similar, which in turn implies "equal weighting". Moreover, as you can see in Table 5, the five RAI indicators are strongly correlated. Accordingly, we created the RAI composite index, combining all that information in the five variables by assigning equal weights to each one.

¹² We did not consider independently the "changes in own community" indicator, as it is a dichotomous variable that does not provide a general picture of empowerment. However, it does represent a component (or dimension) of empowerment; therefore, we included this dimension in the composite index.

Table 3
Principal Component Analysis

Empowerment Variables	Unrotated factor loading			Oblimin Rotation			Varimax Rotation		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
Free Choice Ladder	0.117	0.581	-0.052	0.053	0.572	0.160	0.054	0.572	0.157
Ctrl. Personal Decisions	0.024	0.512	-0.132	-0.034	0.526	0.060	-0.033	0.525	0.056
Changes in own life	0.048	0.516	-0.391	-0.016	0.622	-0.180	-0.016	0.622	-0.184
Changes in community	0.011	0.333	0.906	-0.002	-0.004	0.965	-0.002	-0.006	0.965
RAI - expenditures	0.406	-0.121	-0.022	0.416	-0.062	-0.059	0.416	-0.061	-0.057
RAI - work	0.478	-0.005	0.016	0.476	0.040	0.018	0.476	0.041	0.019
RAI - health	0.447	-0.036	0.041	0.450	-0.001	0.030	0.450	0.000	0.032
RAI - security	0.412	-0.078	0.053	0.419	-0.048	0.026	0.419	-0.047	0.028
RAI - religion	0.469	-0.020	-0.043	0.468	0.046	-0.042	0.468	0.047	-0.041

Note: Shading indicates high loading scores

Source: OPHI-CASEN dataset

Table 4
Empowerment Indicators (Individual)

Kendall-Tau correlation matrix	Free Choice Ladder	Ctrl. Personal Decisions	Changes in own life
Free Choice Ladder	1.000		
Ctrl. Personal Decisions	0.1172*	1.000	
Changes in own life	0.1499*	0.1133*	1.000

Note: (*) represents significance at 1% level.

Source: OPHI-CASEN dataset

Table 5
Domain Specific Indicators: Relative Autonomy Index (RAI)

Kendall-Tau correlation matrix	Religion	Health	Security	Work	Expenditures
Religion	1.000				
Health	0.3924*	1.000			
Security	0.3746*	0.5001*	1.000		
Work	0.3493*	0.4178*	0.3744*	1.000	
Expenditures	0.4125*	0.5434*	0.4700*	0.4115*	1.000

Note: (*) represents significance at 1% level.

Source: OPHI-CASEN dataset

Finally, we define an "**Overall Empowerment Index**" that grouped the three factors identified previously. It will take the value of 0 if the household is not deprived in any factor, 1 if it is deprived in one factor, and so on. Deprivation in this empowerment indicator is assigned when the individual is deemed poor in at least 2/3 factors.

In the case of the first factor, the aforementioned **RAI composite index** was applied. Deprivation in this factor was defined when the respondent slightly disagrees with statement that implies no control OR external control over any domain; and slightly agrees with ability to take decisions over any domain, which corresponds to an index score of three.

For the second factor **general empowerment**, we grouped the free choice ladder, control over personal decisions, and control over one's own life. The poverty threshold for the free choice ladder was defined at the 7th step. Therefore, those individuals who place themselves on the steps 7-10 are considered "empowered" or not poor and those who place themselves on the steps 1-6 are considered deprived or "dis-empowered". In the case of the control over personal decisions, if the individual responded that they had *total control* or *majority of control* over the decisions that affect their daily life they were considered not poor; whereas, if they responded that they had *no control* or *control over some* of the decisions they were considered poor in this indicator. Lastly, for the indicator of

control over changes in one's own life, individuals were considered non-poor if *only* they had power to affect change and poor if a second party affected changes in their lives and not themselves.

For the grouping of these three indicators into the factor general empowerment, we utilized a Union Approach in the identification of the poor, because we desired an identification that was not too demanding. Ergo, we defined $k=2$, in order for the individual to be deemed deprived in the factor general empowerment, he or she had to be considered poor in at least two out of the three indicators of which it is composed.

Lastly, **changes in own community**, no further specification was necessary. Deprivation in this indicator was simply considered if they did not have the ability to affect change in their community. If they did have the power to affect change in their community there were not deemed as poor.

In Table 6 on the following page you will see a brief overview of the four indicators utilized to represent Empowerment Missing Dimension, how deprivation is identified and the Poverty Headcount ascertained using that indicator.

Table 6
Empowerment Indicators

Empowerment Indicators ^{a/}	Name	Definition	Poverty Cut-off	Poverty Headcount
Free Choice Ladder	<i>emp0</i>	Freedom to choose. Scale from 1 (no freedom) to 10 (total freedom)	Steps 6 and below are deemed as poor	16.2%
Control Over Personal Decisions	<i>emp1</i>	Scale from 1 (control over all decisions) to 4 (no control at all)	No control OR Minimum control over personal decisions	38.3%
RAI Composite Index	<i>emp2</i>	Scale from -9 to 9, where the maximum value represents maximum level of empowerment (See RAI definition). Equal weigh for all domain specific variables	The cut-off is the value of 3, meaning some degree of empowerment in domain specific decisions	36.0%
Overall Empowerment Index	<i>emp3</i>	This indicator is composed of three sub-indicators: General Empowerment (GE), Changes in Community (CC), and RAI. We assigned equal weight to each one.	The indicator ranges [0,1]. Poverty cut-off is when overall indicator lies below 0.5 (half of total accomplishment)	19.9%

a/ Normalised Indicators [0-1]

Source: OPHI-CASEN dataset

The below Table 7 shows the Kendall Tau correlation between all of the indicators used to represent Empowerment Missing Dimension, all of which are statistically significant at the 1 percent level. It also compares the percentage of the sample deemed as deprived (P=1) or not deprived (P=0) by each indicator.

Table 7
Correlation of Empowerment Indicators ^{a/}

		emp0		emp1		emp2		emp3	
		P=0	P=1	P=0	P=1	P=0	P=1	P=0	P=1
emp0	P=0 P=1 Ktau Corr.								
emp1	P=0	53.0%	30.7%						
	P=1	8.7%	7.6%						
	Ktau Corr.	0.1062*							
emp2	P=0	54.2%	29.4%	43.2%	18.7%				
	P=1	9.8%	6.6%	20.9%	17.3%				
	Ktau Corr.	0.013		0.1133*					
emp3	P=0	38.8%	44.8%	32.4%	29.3%	40.6%	23.4%		
	P=1	5.0%	11.4%	3.6%	26.7%	3.6%	32.5%		
	Ktau Corr.	0.1804*		0.3010*		0.4314*			

a/ P = 0; represents the non-poor for each indicator. P=1, identifies the poor within each dimension. Tetrachoric correlation estimates are shown at the bottom of each cell.

(*) Represents significance at the 1% level.

Source: OPHI-CASEN dataset

The following Table 8 shows some basic descriptive statistics on our four indicators used to represent the Empowerment Missing Dimension. The indicators were all normalized to values of 0-1, as were their poverty thresholds, so that they could be comparable.

Table 8
Characteristics of the Main Empowerment Indicators ^{a/}

		Obs	Mean	S.D.	Min	Max
emp0	Free Choice Ladder	2033	0.79	0.28	0.00	1.00
emp1	Ctrl. Personal Decisions	2039	0.70	0.28	0.00	1.00
emp2	RAI Composite Index	2046	0.74	0.12	0.42	1.00
emp3	Overall Composite Index	1842	0.71	0.27	0.00	1.00

a/ Indicators were normalized to [0,1], and so the poverty cut-offs.

Source: OPHI-CASEN dataset

ii. Shame

The literature on shame identifies two main domains within which indicators are needed, shame and humiliation. The domain of shame itself is broken down into two separate indicators: *shame associated with poverty* and *shame proneness*. The domain of humiliation is also broken down into two separate indicators: *external humiliation* and *internal humiliation*. We utilized each of these four indicators *individually* to represent the shame missing dimension, as well as an index composed of all four.

Shame associated with poverty. This indicator is designed to extract perceptions of shame associated with poverty, not only if the respondent experiences it, but also how would they perceive their community's stigma against being poor.

The correlations between responses in regards to the individual level, and in regards to their community level are rather high. That being the case, we decided to focus only on the question related to shame at the individual level. We consider the aspect of the indicator pertaining to the community's stigma against being poor to not be part of an individual shame analysis; it is more a statement about how they feel their society works. We can argue that even a non-poor person can acknowledge that his/her peers (of the same socio-economic group) mis-treat the poor populations, albeit not deeming his/herself as poor. Responses do not necessarily imply that the individual is ashamed, but how he/she feels people treat poverty in their society.

Working solely with the individual aspect of the indicator, we performed PCA. We clearly identified two latent dimensions (sub-indicators) within the set of questions relative to "shame" at the individual level, as illustrated in Table 9 below:

Table 9
Shame Indicator

Sub-Indicators	Mean	Obs.	Factor 1	Factor 2	Unexplained
Ashamed of being poor	0.075	2036	0.576	0.054	0.078
Ashamed if someone in my family is poor	0.055	2041	0.586	0.002	0.077
Poor people should be ashamed of beign poor	0.034	2027	0.570	-0.056	0.148
Non poor people, make poor people feel ashamed	0.662	1974	0.000	0.997	0.001

Note: Shading indicates high loading scores

Source: OPHI-CASEN dataset

Shame Proneness. This indicator is designed to identify one's *proneness*, to being ashamed; or, "the tendency to experience the emotion shame in response to specific negative events."¹³ Zavaleta argues, that shame proneness have a stronger affect on the "ability to go without shame" than experiences of shame from a particular moment in time. From a set of ten questions that refer to particular feelings (i.e. embarrassed, ridiculous, red in the cheeks, etc), the respondent is asked to assign a number between 1 (often) and 4 (seldom or never) to express how frequent is each particular feeling in his / her life.

We performed exploratory PCA over the set of questions, and identify the existence of only one latent factor that explains 41% of total variance. Moreover, as shown in Table 10, correlations between responses (sub-indicators) are rather high. Consequently, we defined one synthetic indicator that will take the value of one when the individual has answered at least once that he/she always (response value 1) or frequently (response value 2) have a particular feeling. The indicator takes the value of (0), if he or she answered 3 or 4 (rarely or never, respectively) in all the questions.

¹³ From: Tangney & Dearing, 2002, p. 33; as quote by Zavaleta, 2009, p. 414.

Table 10
Shame Proneness Variables

Kendall Tau Correlation Matrix	Ashamed	Ridic.	Repress.	Humil.	Fool	Little	Paraliz	Embarr.	Laughed	Hated
Feel ashamed	1									
Feel ridiculous	0.4932*	1								
Feel scared to act/speak	0.4071*	0.4009*	1							
Feel humiliated	0.3675*	0.3429*	0.4831*	1						
Feel like a fool	0.3024*	0.4206*	0.3304*	0.3402*	1					
Feel little	0.2135*	0.2044*	0.2643*	0.1937*	0.2393*	1				
Feel paralyzed	0.3407*	0.3442*	0.3554*	0.3942*	0.3108*	0.2278*	1			
Feel embarrassed	0.3057*	0.2704*	0.3481*	0.3398*	0.2420*	0.3210*	0.2653*	1		
Everybody laughs at you	0.3243*	0.4103*	0.3721*	0.4393*	0.4102*	0.2108*	0.3347*	0.3249*	1	
Feel hated	0.2565*	0.3359*	0.2804*	0.3114*	0.3950*	0.1721*	0.2977*	0.1936*	0.4444*	1

Note: (*) Represents significance at the 1% level.

Source: OPHI-CASEN dataset

External Humiliation. This indicator measures humiliation as a result of interaction and refers specifically to three areas: respectful treatment, unfair treatment and discrimination. The first two items reflect concepts capturing values that affect interaction between individuals, while the latter aims to measure actions in particular aspects of daily life.

Discrimination is a notion that can be defined as "to perpetrate an unjust action or inaction against individuals who belong, or are perceived to belong, to a particular group, in particular stigmatized groups" (Pan American Health Organization, 2003); and therefore, it is considered as the "most overt form of humiliation" (Zavaleta, 2007). Following Zavaleta (2007), we acknowledge two main levels of discrimination. The first is prejudicial treatment, which involves a direct question to the respondent as to whether they have felt discriminated against in the last three months.

"Discrimination" is left open enabling the capture of multiple sources and multiple reasons of discrimination. The second, refers more to the perception of discrimination in society, and to specific sources and reasons behind it. In order to study poverty at the household level, we decided to avoid analyzing the second level of discrimination, as it refers more to perception of society's behaviour.

To see if the data supports our analysis, we performed exploratory PCA to the whole set of variables (respectful treatment, unfair treatment and discrimination-both experienced and perceived in society). The PCA clearly identified three main components with 74 percent of the variance explained. The results can be viewed in Table 11 on the following page. The first factor groups the direct questions on respectful treatment, unfair treatment and discrimination. The last two factors refer to the two questions on the perceptions of discrimination in society, which we have argued above to not use. Respectively, the first group gauges the perception of ethical, racial and cultural prejudice on opportunities (i.e. access to public services, employment,

education, etc.), and the second, gender discrimination's effect on opportunities. Given that they represent two independent factors, *and* do not gauge individual's experience of humiliation, we felt justified in leaving them out of our analysis.

Table 11
Principal Component Analysis for External Humiliation Variables

External Humiliation Variables		Unrotated factor loading			Oblimin Rotation			Varimax Rotation		
		Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
Treated with respect		-0.016	0.021	0.567	-0.016	0.021	0.567	-0.016	0.021	0.567
Treated Unfairly ^{a/}		0.000	-0.009	0.618	0.000	-0.009	0.618	0.000	-0.009	0.618
Discrimination ^{a/}		0.018	-0.011	0.543	0.018	-0.011	0.543	0.018	-0.011	0.543
Prejudice against ethnic, racial or cultural origin	Acc. Public. Svs.	0.004	0.367	-0.003	0.004	0.367	-0.003	0.004	0.367	-0.003
	Employ. Pub. Sect.	-0.026	0.397	0.009	-0.026	0.397	0.009	-0.026	0.397	0.009
	Gov. Contracts	-0.009	0.389	0.001	-0.009	0.389	0.001	-0.009	0.389	0.001
	Employ. Priv. Sect.	-0.026	0.382	0.012	-0.026	0.382	0.012	-0.026	0.382	0.012
	Educ. Opport. School	0.027	0.365	-0.010	0.027	0.365	-0.010	0.027	0.365	-0.010
	Educ. Opport. Technical	0.017	0.374	-0.002	0.017	0.374	-0.002	0.017	0.374	-0.002
	Educ. Opport. University	0.021	0.369	-0.010	0.021	0.369	-0.010	0.020	0.369	-0.010
Prejudice against being a woman	Acc. Public. Svs.	0.377	0.001	-0.000	0.377	0.001	-0.000	0.377	0.001	-0.000
	Employ. Pub. Sect.	0.381	-0.009	0.006	0.381	-0.009	0.006	0.381	-0.009	0.006
	Gov. Contracts	0.381	-0.004	-0.011	0.381	-0.004	-0.011	0.381	-0.004	-0.011
	Employ. Priv. Sect.	0.363	-0.001	0.004	0.363	-0.001	0.004	0.363	-0.001	0.004
	Educ. Opport. School	0.382	0.000	0.005	0.382	0.000	0.005	0.382	-	0.005
	Educ. Opport. Technical	0.375	0.008	-0.001	0.375	0.008	-0.001	0.375	0.007	-0.001
	Educ. Opport. University	0.382	0.004	-0.002	0.382	0.004	-0.002	0.382	0.004	-0.002

Note: Shading indicates high loading scores

a/ We transformed the variable so that higher values reflect better treatment

Source: OPHI-CASEN dataset

Returning our focus on the remaining and included factor (composed of respectful treatment, unfair treatment and prejudice), we observe strong and significant correlation levels between all three variables, as exemplified in Table 12 below. The PCA performed identified fairly homogeneous weights for each variable. As a result we created a synthetic index for external humiliation, made up of these three variables. The poor are identified as someone with a deprivation in at least one of the three variables.

Table 12
External Humiliation Indicators

Kendall-Tau correlation matrix	Treat. Respect	Treat. Unfair	Discrim.
Treated with respect	1.000		
Treated Unfairly ^{a/}	0.3211*	1.000	
Discrimination ^{a/}	0.2521*	0.2835*	1.000

Note: (*) represents significance at 1% level.

a/ We transformed the variable so that higher values reflect better treatment

Source: OPHI-CASEN dataset

*Internal Humiliation*¹⁴. This indicator seeks to identify feelings of humiliation that are internal. Regardless of an exogenous event that could potentially "humiliate", we are interested in the identification of the internal response. The respondents must identify if they have ever felt anyone of the listed feelings: excluded, minimized, ridiculed, underestimated, highly criticized, and insulted/poorly treated.

The Table 13 below demonstrates the high levels of correlation between the six responses. Next we performed PCA and discerned only one factor out of the six possible responses. Hence resulting in the creation of a synthetic variable.

¹⁴ Borrowed from Hartling & Luchetta (1999) and their Humiliation Inventory Scale.

Table 13
Internal Humiliation Indicators

Kendall Tau Correlation Matrix		Excl.	Min.	Ridic.	Under.	H.Crit.	Ins/mis
	Excluded	1.000					
How much have you been affected by being	Minimized	0.7288*	1.000				
	Ridiculed	0.5802*	0.6588*	1.000			
	Underestimated	0.5850*	0.6412*	0.6988*	1.000		
	Highly criticized	0.5241*	0.5627*	0.5485*	0.6149*	1.000	
	Insulted/mistreated	0.5062*	0.5335*	0.5662*	0.6248*	0.6108*	1.000

Note: (*) Represents significance at the 1% level.

Source: OPHI-CASEN dataset

It is interesting to note that we initially ran an exploratory PCA over all the variables of shame. We wanted to verify the literature's identification of the four domains (shame, shame proneness, external humiliation and internal humiliation). We found strong evidence that shows the data supports the theory; the PCA clearly identified the four domains. Moreover, it shows evidence that the questions on society's perceptions of discrimination—that we decided to withhold from the analysis—to be clearly separate from the individually related questions, further supporting our decision to not include them.

Finally we define a "Composite Shame Index", composed of all four previously mentioned indicators of shame and humiliation: shame, shame proneness, external humiliation and internal humiliation. We used the Union Approach in deprivation identification; that is to say that if an individual is identified as deprived in one or more of the four dimensions, he/she is considered deprived in the overall Shame Missing Dimension. Table 14 below summarizes the five indicators utilized for the Shame Missing Dimension. Followed by Table 15, showing the Kendall Tau correlations between all of the indicators used to represent Shame Missing Dimension, nearly all of which are statistically significant at the 1 percent level. It also compares the percentage of the sample deemed as deprived (P=1) or not deprived (P=0) by each indicator.

Table 14
Shame Indicators

Shame Indicators ^{a/}	Name	Definition	Poverty Cut-off	Poverty Headcount
Shame	<i>shame0</i>	Ranges from [0,3], and represents the number of sub-indicators in which the respondent declares he/she is ashamed.	When respondent is ashamed in at least one sub-indicator.	9.2%
Shame Proneness	<i>shame1</i>	Ranges from [0,10], and represents the number of sub-indicators in which the respondent declares he/she is prone to being ashamed.	When respondent is prone to be ashamed in at least one sub-indicator.	22.4%
External Humiliation	<i>shame2</i>	Ranges from [0,3]. Sub-indicators are being treated respectfully, being treated fairly, and not being discriminated in any way.	When respondent declares in at least one indicator that are humiliated.	19.1%
Internal Humiliation	<i>shame3</i>	Ranges from [0,6], and represents the number of sub-indicators in which the respondent declares being affected by a set of feelings associated with internal humiliation.	When respondent declares feeling humiliated in at least one indicator	25.4%
Composite Shame Index	<i>shame4</i>	Ranges from [0,4], and comprises information on being poor in each indicator. The indicator takes the value of the number of indicators in which he/she is deprived, according to poverty definitions of each one.	When respondent is poor in at least one of the shame indicators.	47.0%

a/ Normalised Indicators [0-1]

Source: OPHI-CASEN dataset

Table 15
Correlation of Shame Indicators ^{a/}

		shame0		shame1		shame2		shame3		shame4	
		P=0	P=1	P=0	P=1	P=0	P=1	P=0	P=1	P=0	P=1
shame0	P=0 P=1 Ktau Corr.										
shame1	P=0	72.4%	18.5%								
	P=1	5.4%	3.8%								
	Ktau Corr.	0.1543*									
shame2	P=0	74.1%	16.8%	65.6%	11.8%						
	P=1	6.8%	2.4%	15.5%	7.2%						
	Ktau Corr.	0.076		0.2071*							
shame3	P=0	68.8%	21.8%	65.5%	11.8%	63.9%	16.3%				
	P=1	5.8%	3.6%	9.6%	13.0%	10.5%	9.3%				
	Ktau Corr.	0.1254*		0.4055*		0.2648*					
shame4	P=0	53.0%	37.9%	53.0%	22.4%	53.0%	27.6%	53.0%	21.9%		
	P=1	0.0%	9.1%	0.0%	22.6%	0.0%	19.5%	0.0%	25.1%		
	Ktau Corr.	0.3572*		0.6393*		0.5489*		0.6555*			

a/ P = 0; represents the non-poor for each indicator. P=1, identifies the poor within each dimension.

Tetrachoric correlation estimates are shown at the bottom of each cell.

(*) Represents significance at the 1% level.

Source: OPHI-CASEN dataset

Table 16
Characteristics of the Main Shame Indicators ^{a/}

		Obs	Mean	S.D.	Min	Max
shame0	Shame	2014	0.95	0.18	0.00	1.00
shame1	Shame Proneness	1839	0.95	0.12	0.00	1.00
shame2	External Humiliation	1942	0.92	0.18	0.00	1.00
shame3	Internal Humiliation	1789	0.89	0.23	0.00	1.00
shame4	Composite Shame Index	1597	0.81	0.25	0.00	1.00

a/ Indicators were normalized to [0,1], and so the poverty cut-offs.

Source: OPHI-CASEN dataset

Lastly, we show in the above Table 16, some basic descriptive statistics of the four main indicators of shame.

iii. Security

Literature on Safety and Security from violence identifies three possible indicators for comparison: the incidence and frequency of general crime against property, the incidence and frequency general violence against person, and perceptions of threats to security and safety, both now and in the future.

Incidents of threats to physical safety and security: against property. This indicator focuses on the frequency of incidents of property-based crime both in the urban and rural setting, as well as those involving or not involving assault. Property-based crime was included for two reasons: for poor populations even theft can be detrimental and greatly impact their sense of security and safety; and theft and looting are common forms of violence in conflict zones.¹⁵

Incidents of threats to physical safety and security: against person. Diprose (2007) This indicator focuses on the frequency of incidents against person (the respondent or a member of the household), covering: assault, assault with a weapon; whether they have ever been shot, kidnapped, or injured by a bomb, landmine, or other explosive.

¹⁵ Pg. 339-440.

Perceptions of safety and threats of violence. This indicator is designed to identify the respondent's perceptions of security. The indicator is broken down into two different aspects: a) whether the respondent finds it probable that they will be a victim of any of the aforementioned types of violence; and b) on a scale of 1 - 5 how secure do they feel (1=very unsafe / 5=fairly safe) at night walking alone in their neighborhood/being home alone/waiting for public transportation.

In order to determine whether these indicators were capturing the same latent phenomenon or distinct aspects of security we performed an exploratory PCA. We found that there are two distinct latent factors and a third that shares variance with both, as is illustrated in Table 17. The three indicators of fear to walk alone/be home alone/bus stop at night combine for the first factor, while the indicators on attacks against person and crime against property combine to the second factor.

Table 17
Principal Component Analysis

Violence Indicators	Unrotated factor loading		Oblimin Rotation		Varimax Rotation	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
Personal Attack	-0.192	0.669	0.027	0.695	0.031	0.695
Property Crime	-0.197	0.618	0.007	0.648	0.011	0.648
Likelihood of attack ^{a/}	0.336	-0.199	0.257	-0.298	0.255	-0.296
Fear. Walking alone night	0.553	0.182	0.583	-0.009	0.582	-0.004
Fear. Home alone	0.459	0.254	0.516	0.090	0.517	0.094
Fear. Bus stop at night	0.543	0.184	0.573	-0.004	0.573	0.001

Note: Shading indicates high loading scores

a/ It seems this variable shares variance with the two other clearly identifiable factors.

Source: OPHI-CASEN dataset

Given this exploratory analysis we decide to work with three separate indicators for the Security Missing Dimension. Our first indicator is the second factor, attacks against person and crime against property, referred to as **victim of attack & crime**. This indicator is cumulative, taking the value of 0 if the respondent (or a member of the household) has not suffered either type of violence; 1 if they have suffered either one of the two types of violence; and

2 if they have suffered.¹⁶ The individual is deemed poor if they (or a household member) have been a victim of any kind of attack in the last twelve months.

The second indicator used to represent Security Missing Dimension is the first factor identified consisting of the three questions on fear at night (walk alone/ be home alone / wait for the bus), which we refer to as: **feeling vulnerable to violence**. For these indicators we ran a PCA and found them to be equally weighted. Given that information, we combined the three questions into an index taking the value 0 - 3, 1 if deprived in one of the three questions, 2 if deprived in two of the three, and 3 if deprived in all three. Deprivation in each separate question was assigned to the respondents who answered that they were *very unsafe*, or *unsafe* (1 and 2, respectively, out of a scale of 5).

Lastly, we utilized the indicator on **likelihood of attack** as the third representing Security Missing Dimension. We considered this indicator as an overall indicator because of it shared variance with the previous two. If the respondent answered that it was *very probable* or *somewhat probable* that they would be a victim of an attack in the next twelve months they were deemed as poor in this dimension.

On the following page, Table 18 summarizes the previously mentioned indicators for the Security Missing Dimension. In addition it show the poverty headcount for each indicator.

¹⁶ For the sake of simplicity we are not considering the frequency of attack, only if it has every happened.

Table 18
Violence Indicators

Violence Indicators ^{a/}	Name	Definition	Poverty Cut-off	Poverty Headcount
Victim of Attack & Crime	<i>viol0</i>	If the respondent or his/her family have been victim of personal or property attacks. Ranges from [0,2]; 0 "have had no attacks"; 1 "have been victim of either personal or property attacks"; 2 if have had both.	When respondent declares at least one member of his/her family have been victim of any attack in the last 12 months.	22.3%
Feeling vulnerable to violence	<i>viol1</i>	If the respondent feels very insecure or insecure in any of the three hypothetical situations (walking alone in the neighborhood at night, being home alone at night, or waiting for the bus alone at night). Ranges from [0,3], where 0 "fairly safe in all situations", 1 "unsafe in one situation", 2 "unsafe in two", and 3 "unsafe in all the potential situations"	When respondent feels insecure in at least one the hypothetical situations	49.5%
Likelihood of attack	<i>viol2</i>	Question about the likelihood of being attacked next year. The index ranges from [1-4], where 1 is "very likely", and 4 "very unlikely".	If respondent feels that the likelihood of being a victim of any attack next year is very likely or somewhat likely.	54.1%

a/ Normalised Indicators [0-1]

Source: OPHI-CASEN dataset

Table 19 below illustrates the correlations between all three indicators, as well as the percentage deemed as poor (P=1) and non poor (P=0) for each.

Table 19
Correlation of Violence Indicators ^{a/}

		viol0		viol1		viol2	
		P=0	P=1	P=0	P=1	P=0	P=1
viol0	P=0						
	P=1						
	Ktau Corr.						
viol1	P=0	43.1%	34.8%				
	P=1	7.5%	14.6%				
	Ktau Corr.	0.1722*					
viol2	P=0	39.6%	38.4%	30.1%	20.5%		
	P=1	6.6%	15.5%	16.0%	33.4%		
	Ktau Corr.	0.1735*		0.2500*			

a/ P = 0; represents the non-poor for each indicator. P=1, identifies the poor w/i each dimension. Tetrachoric correlation estimates are shown at the bottom of each cell.

(*) Represents significance at the 1% level.

Source: OPHI-CASEN dataset

Lastly, Table 20 below displays basic descriptive statistics for the three indicators of Security Missing Dimension.

Table 20
Characteristics of the Main Violence Indicators ^{a/}

		Obs	Mean	S.D.	Min	Max
viol0	Victim of Attack & Crime	2031	0.872	0.253	0.000	1.000
viol1	Feeling vulner. to violence	2027	0.680	0.369	0.000	1.000
viol2	Likelihood of attack	2044	0.506	0.350	0.000	1.000

a/ Indicators were normalized to [0,1], and so the poverty cut-offs.

Source: OPHI-CASEN dataset

V. Results

Table 21 below illustrates the multidimensional poverty estimates using the traditional poverty dimensions (income, health, education, and housing). As you can see, given a deprivation in only one dimension (k=1) there is a poverty headcount of nearly 60 percent, which corresponds to an adjusted headcount of 23 percent. This table

represents a baseline of poverty given that we are only accounting for four of the traditional dimensions.

Table 21
Multidimensional Poverty Estimates (Alkire - Foster)
(With Traditional Poverty Dimensions)

Dimensions	Poverty Headcount (H)	Adjusted Headcount (M0)	Adjusted Poverty GAP (M1)	Adjusted FGT (M2)
k = 1	0.590	0.229	0.095	0.056
k = 2	0.252	0.144	0.060	0.034
k = 3	0.063	0.050	0.022	0.013
k = 4	0.009	0.009	0.004	0.002

Note. We use the following dimensions: income, housing, education and health
Source: OPHI-CASEN dataset

In the following Table 22 we show how each of the traditional poverty dimensions contributes to the adjusted headcount. Given a deprivation in two dimensions (k=2) education contributes most to poverty with 31 percent, closely followed by income with 30 percent. On the other hand, Chile appears to be a fairly healthy society, considering that health only contributes with 12 percent to poverty estimates (k=2).

Table 22
Contributions of each dimension to Adjusted Headcount
(With Traditional Poverty Dimensions)

Dimensions	Income	Education	Health	Housing	Total
k = 1	31%	32%	10%	26%	100%
k = 2	30%	31%	12%	28%	100%
k = 3	30%	30%	15%	26%	100%
k = 4	25%	25%	25%	25%	100%

Note. We use the following dimensions: income, housing, education and health
Source: OPHI-CASEN dataset

Table 23
Sensitivity of Multidimensional Headcount (H) to changes in
the "Missing Dimensions" indicators

Dimensions	Obs	Mean	Standard Deviation	Min	Max
k = 1	60	0.868	0.046	0.749	0.938
k = 2	60	0.580	0.072	0.396	0.727
k = 3	60	0.297	0.061	0.152	0.440
k = 4	60	0.118	0.036	0.038	0.198
k = 5	60	0.034	0.014	0.008	0.068
k = 6	60	0.007	0.003	0.000	0.014
k = 7	60	0.001	0.001	0.000	0.003

Note: We run simulations for MD Poverty for all the indicators of each Missing Dimension, keeping fixed the traditional ones.

Source: OPHI-CASEN dataset

Following, we included the three missing dimensions to see what happens to overall poverty measure. We calculate the Alkire & Foster multidimensional poverty measurements with all the possible combinations of the different indicators for the three missing dimensions and the given and fixed indicators of the traditional dimensions.¹⁷ We found that overall poverty measure significantly rose for all levels of k, and for all the possible combinations of indicators, proving that the inclusion of the missing dimensions is a relevant aspect of overall poverty and is reasonable to be taken into account for policy making.

The table above shows the minimum, maximum, and average level of overall poverty when using different indicators of each of the Missing Dimensions. We can see that the selection of adequate indicators for each missing dimensions is a key element in poverty analysis, as it largely contributes to the identification of the poor. For example, for k=1 regardless of which indicator (theoretically constructed) we use, it increases poverty headcount, minimum in 27% and maximum in 59%. We see from the above, that a large set of poor households is poor in up to 4 dimensions, being the headcount k=4 (being poor in at least four dimensions) around 20 percent (nearly the headcount for income poor), falling to 7% when increasing to k=5 (being poor in at least five dimensions).

¹⁷ The total possible combinations is 60, as is noted in the Table 23.

Table 24
Sensitivity of Multidimensional Adjusted Headcount (M0) to
changes in the "Missing Dimensions" indicators

Dimensions	Obs	Mean	Standard Deviation	Min	Max
k = 1	60	0.272	0.032	0.192	0.339
k = 2	60	0.231	0.036	0.142	0.309
k = 3	60	0.150	0.034	0.072	0.227
k = 4	60	0.073	0.023	0.023	0.125
k = 5	60	0.025	0.011	0.006	0.051
k = 6	60	0.006	0.003	0.000	0.012
k = 7	60	0.001	0.001	0.000	0.003

keeping fixed the traditional ones.

Source: OPHI-CASEN dataset

Table above shows the same numbers for the Adjusted Headcount (M0). For example, given a deprivation in two dimensions (k=2), there is an average poverty headcount (H) of 58 percent (See Table 23), whereas, for the adjusted headcount (M0), there is 23 percent poverty (on average). As we know from Alkire & Foster theory for Multidimensional FGT, $M0 = H.A$, which implies that almost 40% of the identified as poor are so in exactly two dimensions, while 60% are poor in more than two dimensions.

When we assess for the contribution of each dimension to overall poverty, we run again a simulation with all our potential combinations of indicators of Missing Dimensions, and find out that the Missing Dimensions can contribute to overall poverty even more than the traditional dimensions (even income!). Violence seems to be a very important dimension to evaluate; it contributes on average with 21% to overall poverty, and its contribution varies from 10% to 31%, depending on the simulation. Empowerment contributes on average with 19% to overall poverty, while shame with around 11%. Indicators as income and education contribute on average with 15% each, while health only with 5%.

Table 25
Relative Contribution of each Dimension to Multidimensional
Adjusted Headcount (M0)

Dimensions	Obs	Mean	Standard Deviation	Min	Max
Income	60	0.153	0.019	0.121	0.213
Education	60	0.157	0.020	0.124	0.220
Health	60	0.051	0.006	0.040	0.071
Housing	60	0.126	0.016	0.100	0.176
Empowerment	60	0.189	0.064	0.082	0.320
Violence	60	0.217	0.065	0.107	0.316
Shame	60	0.107	0.048	0.023	0.220

keeping fixed the traditional ones.

Source: OPHI-CASEN dataset

VI. Conclusions

In closing, from the above analysis it is apparent that the multi-dimensional poverty measurement is quite sensitive to the indicators chosen to represent each of the missing dimensions. For all of the missing dimensions we utilized sets of strong sub-indicators, which cover the recognized domains within each dimension. In the case of security for example, we employed the sub-indicators *victim of attacks & crime*, and *feeling vulnerable to violence*; both of which represent acknowledged domains of security, resulting in 22.3 percent and 49.5 percent poverty headcount¹⁸, respectively. The stark contrast in headcounts is a testament to the sensitivity of the measure to the indicators utilized in representing the missing dimensions. We recommend the utilization of indicators covering *all* recognized domains wherever possible

It is interesting to note in the case of empowerment indicators – which have been developed thoroughly over recent years not only in the field of development economics, but also in fields such as psychology and sociology – the marked differences in the number of respondents identified as deprived in the empowerment dimension depending on the indicators used. Exercises such as the one we are concluding are a crucial investigation into the external validity of the instruments and their corresponding measurements.

¹⁸ Please refer to Table 18.

We can conclude as well, that the utilization of composite indices to represent each missing dimension is a preferred methodology over utilizing in its place, an individual and generalized indicator for each dimension. The generalized indicators are independent and orthogonal. It follows therefore that the correlation tables for empowerment and shame, show that the composite indices are, as we would expect, highly correlated with the other generalized indicators and statistically significant¹⁹. Consequently, we argue that the composite indices are sounder instruments for poverty identification.

¹⁹ Please refer to Tables 7 and 15, for empowerment and shame correlation tables, respectively.

VII. References

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